

In the Abstract

Please replace the Abstract with the substitute Abstract as amended below

~~The invention provides systems Apparatus and methods for enabling high fidelity quantum communication over long communication channels even in the presence of significant loss in the channels are disclosed. The invention employs comprising laser manipulation of quantum correlated atomic ensembles using linear optic components (110, 120), optical sources of low intensity pulses (10), beam splitters (150), and single-photon detectors (180, 190) requiring only moderate efficiencies. The invention provides fault-tolerant entanglement generation, and connection, using a sequence of steps that each provide built-in entanglement purification and that are each resilient to the realistic noise. The invention relies upon collective excitation in atomic ensembles rather than single particle excitations in atomic ensembles and result inso that communication efficiency sealing scales polynomially with the total length of a communication channel.~~